

[0082] While the presently preferred embodiment teaches the integration of the touchpad 26 into the keypad 18, it should be recognized that the touchpad 26 might be located elsewhere. The touchpad 26 could be disposed underneath the hard housing 14 and operate in proximity sensing mode. The touchpad 26 could also be disposed in a location where the hard housing 14 has been cut away to reveal a surface of the touchpad so that it operates by direct touch. It should also be considered an aspect of the present invention to provide a touchpad that is disposed under more than one location, such as under the keymat 22, and also under a portion of the hard housing 14. The touchpad 26 might also be disposed under the LCD display screen 8 so as to operate similar to a touch screen as understood by those skilled in the art.

[0083] Another aspect of the invention is a power mode for the touchpad 26. While actuation of the touchpad may be automatic or manual, deactivation may also be automatic or manual. Because the presently preferred embodiment is utilization in a portable information appliance such as the mobile telephone, power consumption is an issue. The touchpad 26 can be designed to go into a sleep mode if no activity is detected for a selectable period of time. However, the user may complete a task, and desire to return to use of the keys 20, or simply desire to not use the mobile telephone. Accordingly, a manual switch may be provided in order to deactivate the touchpad and force it into a sleep mode if the mobile telephone is not being turned off, but left in a phone answering mode.

[0084] It may not be desirable to dedicate a switch to the sole task of touchpad activation or deactivation. Accordingly, it may be preferable to enable a sequence of keys 20 to be pushed to perform this function manually. It could also be made a menu item on the display screen 8 that is selectable by using the touchpad itself.

[0085] The presently preferred embodiment of the mobile telephone is only one example where the present invention may be utilized. The invention is best suited for use in any of a variety of portable information appliances, such as mobile telephones. However, other devices such as personal digital assistants (PDAs), laptop computers, tablet personal computers, or similar mobile computing devices can also benefit from the present invention.

[0086] However, the present invention does not need to be limited strictly to portable information appliances either. The ability to provide a touchpad that is integrated with another input means such as a keypad can be used in any place that a keypad is found, such as in a computer keyboard, and even in a panel of electronic instrumentation such as in an automobile or aircraft.

[0087] Another alternative embodiment that should be addressed is the elimination of mechanical keys. This is accomplished by utilizing the touchpad as both the keypad and the touchpad. In other words, it is possible to switch modes of the touchpad. In keypad mode, the touchpad provides a plurality of discrete regions, each region corresponding to a discrete key of the keypad. When switched to touchpad mode, the touchpad surface operates with touchpad functionality, for example, to provide cursor control.

[0088] It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. Numerous modifications

and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the present invention. The appended claims are intended to cover such modifications and arrangements.

What is claimed is:

1. A portable electronic appliance comprising:

a keypad having a plurality of keys, wherein each of the plurality of keys is arranged so as to actuate a respective mechanical switch so as to provide a first type of user input; and

an impedance sensing means disposed integrally with the keypad so as to provide a second type of user input.

2. The portable electronic appliance as defined in claim 1 wherein the keypad includes a region wherein the impedance sensing means is capable of operation, and the region is characterized as having no keys disposed above the touchpad.

3. The portable electronic appliance as defined in claim 2 wherein the plurality of keys are formed as part of a keymat.

4. The portable electronic appliance as defined in claim 3 wherein the impedance sensing means is disposed adjacent to the keymat.

5. The portable electronic appliance as defined in claim 4 wherein the keymat and the impedance sensing means are coextensive.

6. The portable electronic appliance as defined in claim 5 wherein the plurality of keys are comprised of a rubber-like material that does not interfere with operation of the impedance sensing means.

7. The portable electronic appliance as defined in claim 6 wherein the impedance sensing means is configured so as to detect the presence and location of a finger that is disposed over the impedance sensing means, and touching the surface of the plurality of keys, or a surface of the portable electronic appliance that is immediately adjacent and in between the plurality of keys.

8. The portable electronic appliance as defined in claim 7 wherein the impedance sensing means is further comprised of:

a first electrode grid; and

a second electrode grid disposed coextensive with the first electrode grid.

9. The portable electronic appliance as defined in claim 8 wherein the impedance sensing means further comprise:

the first electrode grid arranged with electrodes generally in parallel, but with non-uniform spacing therebetween; and

the second electrode grid arranged with electrodes generally in parallel, but with non-uniform spacing therebetween.

10. The portable electronic appliance as defined in claim 9 wherein the impedance sensing means and the plurality of keys further comprise:

a plurality of apertures disposed through the impedance sensing means; and

a post disposed on a bottom side of each of the plurality of keys, wherein each post is positioned in the keymat so as to be capable of passing through one of the plurality of apertures in the impedance sensing means if a key is pressed.